

CLAIMS:

1. A method comprising:

detecting an episode of atrial tachycardia in a heart;

5 applying an atrial pacing therapy to the heart to treat the atrial tachycardia; and automatically reapplying the atrial pacing therapy during the episode.

10 2. The method of claim 1, further comprising reapplying the atrial pacing therapy in response to a change in atrial rhythm.

15 3. The method of claim 2, further comprising reapplying the atrial pacing therapy in response to a change in a cycle length of the atrial rhythm.

4. The method of claim 2, further comprising reapplying the atrial pacing therapy in response to a change in regularity of the atrial rhythm.

5. The method of claim 1, further comprising reapplying the atrial pacing therapy following elapse of a predetermined period of time.

20 6. The method of claim 1, further comprising:

applying a plurality of atrial pacing therapies; and

automatically reapplying at least one of the atrial pacing therapies during the episode.

25 7. The method of claim 1, further comprising:

applying at least part of a first sequence of atrial pacing therapies when the atrial rhythm represents atrial tachycardia with a cycle length in a first range; and

30 applying at least part of a second sequence of atrial pacing therapies when the atrial rhythm represents atrial tachycardia with a cycle length in a second range, wherein at least some of the atrial pacing therapies from the first and second sequences are substantially identical; and

automatically reapplying the atrial pacing therapy by applying at least one of the substantially identical atrial pacing therapies from the first and second sequences when the cycle length of the atrial rhythm changes between the first range and the second range.

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8. The method of claim 7, further comprising:

applying each of the atrial pacing therapies in the first sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the first range, or all of the atrial pacing therapies in the first sequence have been applied; and

in the event the cycle length of the atrial rhythm reenters the first range, applying any unapplied atrial pacing therapies in the first sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the first range, or all of the atrial pacing therapies in the first sequence have been applied.

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9. The method of claim 8, further comprising:

disarming each of the applied atrial pacing therapies in the first sequence to prevent reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia; and

following a predetermined period of time, rearming the applied atrial pacing therapies in the first sequence to permit reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia.

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10. The method of claim 9, further comprising:

applying each of the atrial pacing therapies in the second sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the second range, or all of the atrial pacing therapies in the second sequence have been applied; and

in the event the cycle length of the atrial rhythm reenters the second range, applying any unapplied atrial pacing therapies in the second sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is

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outside of the second range, or all of the atrial pacing therapies in the second sequence have been applied.

11. The method of claim 10, further comprising:

disarming each of the applied atrial pacing therapies in the second sequence to prevent reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia; and

following a predetermined period of time, rearming the applied atrial pacing therapies in the first sequence to permit reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia.

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12. The method of claim 7, wherein the atrial pacing therapies in each of the first and second sequences are arranged in sequential order from least aggressive to most aggressive.

13. The method of claim 7, wherein the atrial pacing therapies in each of the first and second sequences include an atrial burst therapy, an atrial ramp therapy, and atrial cardioversion.

14. The method of claim 1, further comprising:

applying at least part of a first sequence of atrial pacing therapies when the atrial rhythm has a cycle length in a first range and the cycle length is substantially regular;

applying at least part of a second sequence of atrial pacing therapies when the atrial rhythm has a cycle length in a second range and the cycle length is substantially regular;

applying at least part of a third sequence of atrial pacing therapies when the atrial rhythm is irregular, wherein at least some of the atrial pacing therapies from the first, second and third sequences are substantially identical; and

automatically reapplying the atrial pacing therapy by applying at least some of the substantially identical atrial pacing therapies from the first, second and third sequences.

15. The method of claim 14, further comprising:

applying each of the atrial pacing therapies in the third sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is regular, or all of the atrial pacing therapies in the third sequence have been applied

5 in the event the cycle length of the atrial rhythm becomes irregular, applying any unapplied atrial pacing therapies in the third sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is regular, or all of the atrial pacing therapies in the third sequence have been applied.

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16. The method of claim 15, further comprising:

disarming each of the applied atrial pacing therapies in the third sequence to prevent reapplication of the applied atrial pacing therapies in the third sequence during the episode of atrial tachycardia; and

15 following a predetermined period of time, rearming the applied atrial pacing therapies in the third sequence to permit reapplication of the applied atrial pacing therapies in the third sequence during the episode of atrial tachycardia.

17. The method of claim 16, wherein the atrial pacing therapies in the third sequence are arranged in sequential order from least aggressive to most aggressive.

18. The method of claim 17, wherein the atrial pacing therapies in the third sequence include an atrial burst therapy, atrial ramp therapy, and atrial cardioversion.

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19. The method of claim 1, further comprising:

applying a shock therapy to the heart in the event the irregular heart rhythm satisfies criteria for application of the shock therapy; and

30 just prior to applying the shock therapy, reapplying a sequence of the atrial pacing therapies to attempt to terminate the episode of atrial tachycardia.

20. The method of claim 1, further comprising applying the atrial pacing therapy via an implanted lead.

21. A system comprising:

a detector that detects an episode of atrial tachycardia in a heart;

5 a controller that applies an atrial pacing therapy to the heart to treat the atrial tachycardia, and automatically reapplies the atrial pacing therapy during the episode.

22. The system of claim 21, wherein the controller reapplies the atrial 10 pacing therapy in response to a change in atrial rhythm.

23. The system of claim 22, wherein the controller reapplies the atrial 15 pacing therapy in response to a change in a cycle length of the atrial rhythm.

24. The system of claim 22, wherein the controller reapplies the atrial 20 pacing therapy in response to a change in regularity of the atrial rhythm.

25. The system of claim 21, wherein the controller reapplies the atrial 25 pacing therapy following elapse of a predetermined period of time.

26. The system of claim 21, wherein the controller applies a plurality of atrial 30 pacing therapies, and automatically reapplies at least one of the atrial pacing therapies during the episode.

27. The system of claim 21, wherein the controller:

25 applies at least part of a first sequence of atrial pacing therapies when the atrial rhythm represents atrial tachycardia with a cycle length in a first range; and

30 applies at least part of a second sequence of atrial pacing therapies when the atrial rhythm represents atrial tachycardia with a cycle length in a second range, wherein at least some of the atrial pacing therapies from the first and second sequences are substantially identical; and

35 automatically reapplies the atrial pacing therapy by applying at least one of the substantially identical atrial pacing therapies from the first and second sequences

when the cycle length of the atrial rhythm changes between the first range and the second range.

28. The system of claim 27, wherein the controller:

5 applies each of the atrial pacing therapies in the first sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the first range, or all of the atrial pacing therapies in the first sequence have been applied; and

10 in the event the cycle length of the atrial rhythm reenters the first range, applies any unapplied atrial pacing therapies in the first sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the first range, or all of the atrial pacing therapies in the first sequence have been applied.

29. The system of claim 28, wherein the controller:

15 disarms each of the applied atrial pacing therapies in the first sequence to prevent reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia; and

20 following a predetermined period of time, rearms the applied atrial pacing therapies in the first sequence to permit reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia.

30. The system of claim 29, wherein the controller:

25 applies each of the atrial pacing therapies in the second sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the second range, or all of the atrial pacing therapies in the second sequence have been applied; and

30 in the event the cycle length of the atrial rhythm reenters the second range, applies any unapplied atrial pacing therapies in the second sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is outside of the second range, or all of the atrial pacing therapies in the second sequence have been applied.

31. The system of claim 30, wherein the controller:
disarms each of the applied atrial pacing therapies in the second sequence to
prevent reapplication of the applied atrial pacing therapies in the first sequence during
the episode of atrial tachycardia; and

following a predetermined period of time, rearms the applied atrial pacing therapies in the first sequence to permit reapplication of the applied atrial pacing therapies in the first sequence during the episode of atrial tachycardia.

32. The system of claim 27, wherein the atrial pacing therapies in each of the first and second sequences are arranged in sequential order from least aggressive to most aggressive.

33. The system of claim 27, wherein the atrial pacing therapies in each of the first and second sequences include an atrial burst therapy, an atrial ramp therapy, and atrial cardioversion.

34. The system of claim 21, wherein the controller:

- applies at least part of a first sequence of atrial pacing therapies when the atrial rhythm has a cycle length in a first range and the cycle length is substantially regular;
- applies at least part of a second sequence of atrial pacing therapies when the atrial rhythm has a cycle length in a second range and the cycle length is substantially regular;
- applies at least part of a third sequence of atrial pacing therapies when the atrial rhythm is irregular, wherein at least some of the atrial pacing therapies from the first, second and third sequences are substantially identical; and

automatically reapplies the atrial pacing therapy by applying at least some of the substantially identical atrial pacing therapies from the first, second and third sequences.

35. The system of claim 34, wherein the controller:

applies each of the atrial pacing therapies in the third sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is regular, or all of the atrial pacing therapies in the third sequence have been applied
5 in the event the cycle length of the atrial rhythm becomes irregular, applies any unapplied atrial pacing therapies in the third sequence until the episode of atrial tachycardia is terminated, the cycle length of the atrial rhythm is regular, or all of the atrial pacing therapies in the third sequence have been applied.

10 36. The system of claim 35, wherein the controller:

disarms each of the applied atrial pacing therapies in the third sequence to prevent reapplication of the applied atrial pacing therapies in the third sequence during the episode of atrial tachycardia; and
15 following a predetermined period of time, rearms the applied atrial pacing therapies in the third sequence to permit reapplication of the applied atrial pacing therapies in the third sequence during the episode of atrial tachycardia.

20 37. The system of claim 36, wherein the atrial pacing therapies in the third sequence are arranged in sequential order from least aggressive to most aggressive.

38. The system of claim 37, wherein the atrial pacing therapies in the third sequence include an atrial burst therapy, atrial ramp therapy, and atrial cardioversion.

25 39. The system of claim 21, wherein the controller:

applies a shock therapy to the heart in the event the irregular heart rhythm satisfies criteria for application of the shock therapy; and
just prior to applying the shock therapy, reapplies a sequence of the atrial 30 pacing therapies to attempt to terminate the episode of atrial tachycardia.

40. The system of claim 21, wherein the detector and the controller are contained in an implantable housing, the system further comprising an implantable lead that delivers the applied atrial pacing therapy to the heart.

41. A method comprising:

detecting an episode of atrial tachycardia in a heart;

detecting a condition of the atrial tachycardia;

5 selecting one of several sequences of the atrial pacing therapies based on the detected condition;

applying the atrial pacing therapies in the selected sequence to treat the atrial tachycardia;

disarming each of the applied atrial pacing in the selected sequence to prevent reapplication of the applied atrial pacing therapies for the detected condition during the episode of atrial tachycardia; and

10 following a predetermined period of time, rearming the applied atrial pacing therapies in the selected sequence to permit reapplication of the applied atrial pacing therapies for the detected condition during the episode of atrial tachycardia.

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42. The method of claim 41, wherein the detected condition is a cycle length of the atrial rhythm.

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43. The method of claim 41, wherein the detected condition is a combination of a cycle length and regularity of the atrial rhythm.

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44. The method of claim 41, wherein at least some of the atrial pacing therapies in the sequences are substantially identical.

45. The method of claim 41, further comprising applying each of the atrial pacing therapies in the selected sequence until the episode of atrial tachycardia is terminated, the detected condition of the atrial rhythm changes, or all of the atrial pacing therapies in the selected sequence have been applied.

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46. A system comprising:

a detector that detects an episode of atrial tachycardia in a heart and a condition of the atrial tachycardia; and

a controller that selects one of several sequences of the atrial pacing therapies based on the detected condition, applies the atrial pacing therapies in the selected sequence to treat the atrial tachycardia, disarms each of the applied atrial pacing in the selected sequence to prevent reapplication of the applied atrial pacing therapies for the detected condition during the episode of atrial tachycardia, and following a predetermined period of time, rearms the applied atrial pacing therapies in the selected sequence to permit reapplication of the applied atrial pacing therapies for the detected condition during the episode of atrial tachycardia.

10 47. The system of claim 46, wherein the detected condition is a cycle length of the atrial rhythm.

15 48. The system of claim 46, wherein the detected condition is a combination of a cycle length and regularity of the atrial rhythm.

49. The system of claim 46, wherein at least some of the atrial pacing therapies in the sequences are substantially identical.

20 50. The system of claim 46, wherein the controller applies each of the atrial pacing therapies in the selected sequence until the episode of atrial tachycardia is terminated, the detected condition of the atrial rhythm changes, or all of the atrial pacing therapies in the selected sequence have been applied.

25 51. A computer-readable medium carrying instructions to cause a processor to: detect an episode of atrial tachycardia in a heart; apply an atrial pacing therapy to the heart to treat the atrial tachycardia; and automatically reapply the atrial pacing therapy during the episode.

30 52. A computer-readable medium carrying instructions to cause a processor to: detect an episode of atrial tachycardia in a heart; detect a condition of the atrial tachycardia;

select one of several sequences of the atrial pacing therapies based on the detected condition;

apply the atrial pacing therapies in the selected sequence to treat the atrial tachycardia;

5 disarm each of the applied atrial pacing in the selected sequence to prevent
reapplication of the applied atrial pacing therapies for the detected condition during
the episode of atrial tachycardia; and

following a predetermined period of time, rearm the applied atrial pacing therapies in the selected sequence to permit reapplication of the applied atrial pacing therapies for the detected condition during the episode of atrial tachycardia.

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